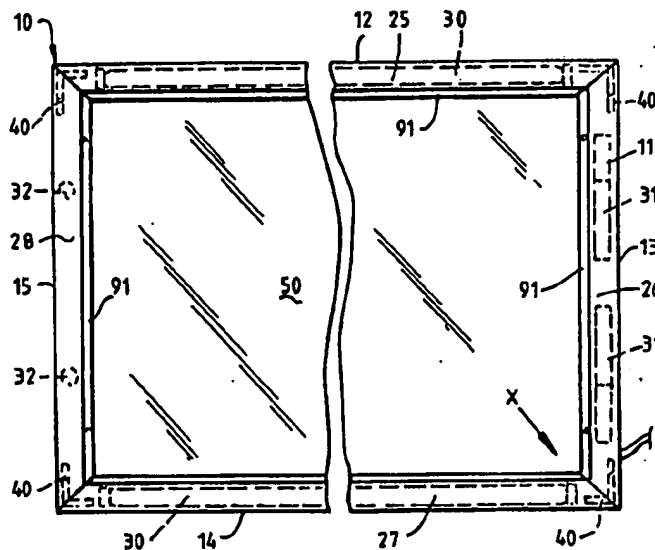




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/AU95/00262 (22) International Filing Date: 4 May 1995 (04.05.95) (30) Priority Data: PM 5416 4 May 1994 (04.05.94) AU (71)(72) Applicants and Inventors: MATYEAR, John [AU/AU]; 29 Allowrie Street, Jamberoo, NWS 2533 (AU). BUICK, Garry, McDonald [GB/AU]; 65 Turner Road, Langwarrin, VIC 3910 (AU). (74) Agent: GRIFFITH HACK & CO.; 509 St. Kilda Road, Melbourne, VIC 3004 (AU).		(81) Designated States: AU, JP, KR, NZ, SG, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.

(54) Title: ILLUMINATED DISPLAY



(57) Abstract

An edge lit display (10) comprises a display panel (50), a rectangular frame (11) for supporting the display panel (50), and a lamp assembly (30) arranged in the frame (11) for edge lighting the display panel (50). The frame (11) comprises four sides (12, 13, 14, 15) interconnected at the corners by angled corner connectors (40). A bracket in each side supports a lamp assembly (30). Each side comprises a first frame member and a cover frame member (25, 26, 27, 28). The angled corner connectors (40) secure the first frame members to the cover frame members (25, 26, 27, 28) via fasteners accessible from the exterior of the frame (11) and hold the frame (11) together around the periphery of the display panel. The fasteners are such that the cover frame members (25, 26, 27, 28) may be removed to allow access to the lamp assembly (30) without affecting the integrity of the frame (11).

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Title

Illuminated Display

Field of the Invention

5 The invention relates to improved housings for edge lit illuminated displays in which the light source is housed on the side of the display box or board.

Background of the Invention

10 Illuminated display boards and boxes are used to illuminate transparencies that carry information such as writing, x-ray data, draftsman plans, or advertising signs. Usually, they are of a conventional back lit construction wherein the housing of the display box or board carries a series of lights, generally of the fluorescent type, behind a translucent surface upon or within which the information to
15 be illuminated is placed.

Recent developments have led to the manufacture of the edge lit illuminated display box or board wherein the light source, generally a fluorescent light, is placed along one or more of the edges of a display panel which comprises a
20 transparent sheet having a matrix of dots on one or both of its flat surface(s). The light is deflected by the dots in such a way that it is emitted from the dotted flat surface(s) of the transparent sheet. Information from transparencies or advertising signs can be placed on top of

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the dot matrix and illuminated in this manner. A detailed description of the dot matrix can be found in International application PCT/AU91/00436, the complete details of which are incorporated herein by reference. The panel
5 incorporating the dot matrix is known as a PRISMEX panel.

These edge lit or non-conventional back illuminated boxes or boards provide more even illumination of the information on the transparency or advertising sign and use fewer lamps than conventional back lit displays. Thus edge lit
10 illuminated displays are aesthetically more pleasing and energy efficient compared to conventional back lit display boxes or boards.

As the fluorescent lamps are on the edge, the boxes and boards can also be slimmer than conventional back lit
15 boxes. This makes them particularly attractive for advertising signs and useful where there is a minimal amount of space to mount the sign. In a typical housing used in edge lit illuminated display boxes and boards the extrusions can have a hinge section that opens to allow
20 access into the housing for maintenance and lamp replacement. This latter construction however requires that the housing is of a certain minimal size governed not only by the size of the lamp and/or electronics but also by the need to allow the hinged portion to swivel. The known
25 housings of these edge lit boxes and boards are thus unnecessarily bulky. The repairers can have difficulty in getting to the wiring, starter switch and/or the fluorescent lamps. With a construction requiring a hinged section that swivels, there is also a limitation as to
30 where the advertising signs can be mounted and it is extremely difficult to manufacture the joining portions with the high precision needed to produce an aesthetically pleasing board for advertising signs.

In other housing for edge lit illuminated boards or boxes

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the external sections are positioned with screws, but are not designed to provide easy access to the electric components.

Also edge lit illuminated displays for advertising signs carry a transparent protective cover such as clear plastic which protects the sign from the external environment. In the prior art boxes it is difficult to remove the protective cover and to replace the advertising sign without dismantling the housing.

10 Summary of the Invention

According to the present invention there is provided an edge lit display comprising a display panel; a rectangular frame for supporting the display panel; and a lamp assembly arranged in the frame for edge lighting the display panel, the frame comprising four sides interconnected at the corners, each side comprising a first frame member and a second frame member adapted to be releaseably connected together, a bracket adapted to be located within either frame member, the bracket adapted to support the lamp assembly, and angled corner connectors wherein the corner connectors allow the first and second frame members to be secured at corners of the frame, fasteners being provided accessible from the exterior of the frame and adapted to connect the frame members to the bracket and each corner member to hold the frame together around the periphery of the display panel whereby either frame member can be removed to provide access to the lamp assembly without affecting the integrity of the frame.

Description of the Drawings

30 The invention will be described, below for example, with reference to the accompanying drawings in which:

Figure 1 is a front perspective view of an edge lit display according to a preferred embodiment of the

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invention;

Figure 2 is a front view of the display of Figure 1;

5 Figure 3 is a detailed view of a corner of a frame of
the display according to the preferred embodiment of
the invention;

Figure 4 is a detailed corner view;

Figure 5 is a front view (partially cut-away) of the
corner shown in Figure 4;

Figure 6 is a view along the line 6-6 of Figure 5;

10 Figure 7 is a view along the line 7-7 of Figure 5;

Figure 8 is a view along the line 8-8 of Figure 5;

Figure 9 is a view along the line 9-9 of Figure 5;

Figure 10 is an exploded view of the arrangement
shown in Figure 9;

15 Figure 11 is a view of an alternative arrangement for
securing a protective cover to the display; and

20 Figures 12 and 13 are schematic illustrations of one
edge of an edge lit display of a further embodiment
showing use as double sided and single sided signs
respectively.

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Description of the Preferred Embodiment of the Invention

With reference to Figures 1 and 2 an edge lit display 10 is shown which comprises a display panel 50 supported in a frame 11. The frame 11 is made up of four frame segments 12, 13, 14 and 15. Each of the frame segments has a base section 16, 17, 18, and 19. The base sections 16 to 19 support L-shaped plates 20, 21, 22 and 23. The frame sections 12 to 15 are closed by a cover section 25, 26, 27 and 28.

10 As is shown in Figure 2, frame segments 12 and 14 house fluorescent lamps 30 and the frame section 13 contain a ballast or electric circuit 31 and starters 32 (if needed) and any other associated electronic componentry required to power the fluorescent lamps 30. Additional electronic
15 circuitry may be contained in the section 15.

A right angle bracket 40 is arranged at each corner for securing the frame segments 12 to 15 together.

Figure 3 shows a detailed view of one corner X of the frame 11 of Figures 1 and 2. The other corners are identical.

20 The base sections 17 and 18 are of square U-shaped cross section as shown in Figure 3 and comprise bases 51, 52 and sides 53, 54 and 55, 56 respectively.

The L-shaped plates 21 and 22 comprise leg sections 61 and 62 and 63 and 64 respectively. The cover sections 26 and
25 27 are also of square U-shaped cross section and comprise front sections 71 and 72 and sides 73, 74 and 75, 76 respectively.

The right angle brackets 40 are provided with four holes 41, 42, 43 and 44. The L-shaped plates 21 and 22 are
30 located in base portions 17 and 18 by locating the leg 61 and leg 63 against bases 51 and 52 respectively. The legs

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62 and 64 extend parallel to sides 53 and 56 and extend beyond the ends of those sides. The right angled bracket 40 is arranged in the corner formed by the frame sections 13 and 14 as is clearly shown in Figure 3 and a screw or bolt 39 is located through aligned openings in the side 53, the leg 62 and the hole 42 to thereby secure the L-shaped plate 21 to the base portion 17. A fastener 38 passes through aligned openings in the side 56, the leg 64 and the hole 41 to secure the L-shaped plate 22 to the base section 18. The right angle bracket 40 therefore also secures the base section 17 and L-shaped plate 21 of the frame segment 13 to the base 18 and L-shaped plate 22 of the frame segment 14.

The frame segments 13 and 14 are completed by cover portions 26 and 27. The leg 73 is provided with a hole 37 which aligns with a hole in the L-shaped plate 21 and the hole 43 in the right angle bracket 40. A hole 36 is provided in the side 76 of the cover portion 27 and aligns with a hole in the L-shaped plate 22 and the hole 44 in the L-shaped bracket 40. The cover portions 26 and 27 are located on the L-shaped plates 21 and 22 respectively and fasteners 81 and 82 pass through the aligned holes 37, 43 and 36, 44 to thereby secure the cover portions 26 and 27 in place. In order to remove any one of the cover portions 25, 26, 27 or 28 the fasteners 81 and 82 at each end of the respective cover portion 25, 26, 27 or 28 are removed and the cover portion can simply be lifted off the remainder of the frame segment to gain access to the lamps 32 or electric and/or electronic components 31 and 32 arranged within the frame segments.

As is best shown in Figure 4, when the frame is secured together a space exists between the sides 54 and 74 of the segment 13. Similar spaces are arranged between the respective other side 55 and 75 of the frame segment and the other frame segments 12 to 15.

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The space between the sides 54 and 74 etc receive edges of the display panel 50 to locate the display panel 50 within the frame 11. Thus, when the lamps 30 are powered light passes into the display panel 50 from edges of the display panel 50 and is reflected outwardly by the dot matrix formed in or on the display panel 50. Advertising material, or any other material which is to be viewed may be arranged on both sides of the display panel 50 in the form of a sheet 8 or 9 as is shown in Figure 4. A pair of protective covers 91 within the frame 11 to protect the advertising material sheets 8 and 9. The covers 91 comprise U-shaped frame section 92 and a glass or plastic sheet 93 supported in the frame 11.

The base sections 18 and 16 and their associated L-shaped plates 22 and 20 can be provided with reflectors 95. The cover portions 25 and 27 can also be provided with reflectors 95 and 96. The reflectors 95 and 96 assist in reflecting light from the lamps 30 into the side edges of the display panel 50 for illuminating the advertising material sheets 8 and 9 arranged on the display panel 50.

As is shown in Figures 5 and 8, each of the frame segments 12 to 15 is provided with a block 100 arranged in the respective base sections 16 to 19. The block 100 is secured to the respective L-shaped plate by screws 101 or alternatively by glue. The display panel 50 is drilled with a hole 102 which receives a screw 103 which passes through the hole 102 and into the block 100 to thereby secure the panel 50 in place.

As is also shown in Figures 5, 9 and 10, the block 100 is provided with a spring loaded ball 105 which is biased outwardly of the block 100 by a spring 106 arranged in a hole in the block 100. The spring loaded ball 105 projects through a hole 110 formed in the leg 54 and engages with the frame 92 of the protective cover 91 to secure the cover

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91 in place. The cover 91 can be provided with a recess or hole 112 for accommodating the ball 105. Thus, the cover 91 can be merely pressed in position and the spring ball will be biased back in towards the block 100 against the bias of spring 106 until the recess or hole 112 is brought into alignment with the ball 105 where upon the ball is biased to seat in the recess or hole 112 to thereby secure the cover 91 in place. The cover 91 can be removed by simply pulling the cover outwardly so that the pulling movement pushes the ball 105 inwardly towards the block 100 to enable the cover 91 to release and be detached from the frame 11.

A block (now shown) in the opposite frame segment 15 to that shown in Figure 9 can also be provided with a spring loaded ball (now shown) for securing the opposite side of the cover 91.

The cover 91 on the opposite side of the display panel 50 (that is on the cover portion 26 side of the display panel 50), can also be secured in place in a similar manner. In this regard a block (not shown) with a spring loaded ball (now shown) can be arranged in the cover portion 26 for securing the other protective cover 91 in place in the same manner as that described above. This block (now shown) is secured in place by a screw (not shown) passing through side 79.

Figures 11 and 12 show alternative arrangements for securing the cover 91 in place.

In the embodiment of Figure 11 the side 54 of the base section 17 is provided with a slot 120 which received legs 121 and 122 of a spring clip 123. The spring clip 123 can be pushed into spring locking position with the frame of the cover 91 to locate the cover 91 in place.

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The preferred embodiment of the invention which includes the L-shaped plates 20 to 23 and the right angled brackets 40 allows cover portions 25 to 28 to be removed by undoing the screws 81 and 82 from the respective cover portion and removing the cover portion from the remainder of the frame and also allows the base portions 16 to 19 to be removed from the frame if necessary by undoing the screws 38 and 39 and removing the respective base portion from the remainder of the frame. Thus, access can be gained to the internal cavity within the frame segments 12 to 15 by removing the cover portions 25 to 26 or if necessary or desired by removing the base portions 16 to 19. The L-shaped plates 20 to 23 and the brackets 40 maintain the integrity of the frame notwithstanding the removal of either a cover portion 25 to 28 or a base portion 16 to 19. Thus, the frame remains firmly intact with the lamps 30 or electric and/or electronic components 31 and 32 firmly secured within the frame.

The holes 36 and 44 in the cover portions 25 to 28 and the corresponding holes in the base portions 16 to 19 are bevelled holes and are slightly offset with respect to the holes 43, 44 and 41, 42 respectively. The slight offset causes the cover portions 25 to 28 and base portions 16 to 19 to be forced towards the adjacent cover portion or base portion at the corners of the frame so the adjacent cover portions and base portions neatly abut one another. The offset arrangement also produces a force towards the centre of the display to help support the display panel.

In the embodiment illustrated in Figures 12 and 13, the illuminated display is shown schematically with details omitted for clarity. It is understood that the arrangement of the display including the components and the manner in which they fit together is substantially the same as described earlier in the specification. In Figure 12, a display is illustrated for use as a double sided sign. The

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PRISMEX panel 50 is located within the frame in a similar manner to the previous embodiments except that the inner sides of the frame segments are provided with a laterally extending lip 150 that extends around the inner periphery of the sign over the adjacent edge of the panel 50. The lip 150 which can be seen from Figure 12 extends on both sides of the panel holds a 2mm clear spacer 151, 152 that sits on top of the PRISMEX panel. The advertising transparency 156, 157 then sits on top of the clear spacer 151, 152 outside the projecting lip 150 and a 3mm clear perspex cover 160 and with its edge frame means 161 is located thereon in the same manner as described in earlier embodiments. In Figure 13, the same arrangement is shown except that it relates to a single sided sign. The same inwardly projecting lips 150 are provided on the frame segments except the rear side of the panel has a white backing sheet 165 between the PRISMEX panel 150 and the lip 150. The embodiments shown in Figures 13 and 14 provide the advantage that the lip 150 holds the spacers 151, 152 or white backing sheet 165 in position and overcomes the necessity of using double sided tape to locate these components. The lip also prevents light leakage at the edges of the join between the panel and the frame. The light leakage tends to cause a band of light at the edges which spoils the overall effect of the sign. The provision of the lip ensures that no such band is present.

It will be apparent to the person skilled in the art that while the invention has been described in some detail for the purposes of clarity and understanding, various modifications and alterations to the embodiments and methods described herein may be made without departing from the scope of the inventive concept disclosed in this specification.

The illuminated display described above provides an elegant and efficient means of displaying signs especially

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advertising material. The artwork is protected in a sturdy elegant frame with ready access to the electrics without having to dismantle the whole assembly. The exterior of the frame only uses fasteners at the corners and these are

5 discretely counter-sunk. The display is very thin (only 50mm), a feature that facilitates many additional avenues of use.

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CLAIMS

1. An edge lit display comprising a display panel; a rectangular frame for supporting the display panel; and a lamp assembly arranged in the frame for edge lighting the display panel, the frame comprising four sides interconnected at the corners, each side comprising a first frame member and a second frame member adapted to be releaseably connected together, a bracket adapted to be located within either frame member, the bracket adapted to support the lamp assembly, and angled corner connectors wherein the corner connectors allow the first and second frame members to be secured at corners of the frame, fasteners being provided accessible from the exterior of the frame and adapted to connect the frame members to the bracket and each corner member to hold the frame together around the periphery of the display panel whereby either frame member can be removed to provide access to the lamp assembly without affecting the integrity of the frame.
2. The edge lit display according to claim 1 wherein each frame member comprises a right angled U-shaped section having a base and upstanding inner and outer flanges.
3. The edge lit display according to claim 2 wherein the bracket is L-shaped having one leg that locates in the base of a frame member with the other leg extending past the outer flange of the frame member whereby when the frame members are placed one on top of the other, the end of the other leg engages the base of the second frame member to locate the position of the second frame member relative to the first frame member, the inner flanges of the first and second frame members defining a gap therebetween into which the panel is located.
4. The edge lit display according to either claims 2 or 3 wherein the inner flanges of the first and second frame members have outwardly projecting lips that extend over the adjacent edges of the panel.
5. The edge lit display according to any one of the preceding claims wherein the ends of the frame members are

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bevelled so that the frame members can be attached in abutting contact at right angles to one another.

6. The edge lit display according to any one of the preceding claims wherein the fasteners extend through holes
5 in the first and second frame members and corner connectors to engage screw threaded holes in the bracket, the holes in the first and second frame members being offset with respect to the screw threaded holes in the bracket so that respective first frame members and respective second frame
10 members are forced towards each other providing an inward force from both first and second frame members towards the centre of the display to assist the support of the panel.

7. The edge lit display according to any one of the preceding claims wherein the lamp assembly comprises a
15 fluorescent tube located along one edge of the frame, the tube being supported by the bracket which in turns supports the electric components associated with the fluorescent tube.

8. The edge lit display according to claim 7 wherein the
20 fluorescent tube is surrounded by a reflector which reflects light towards the panel.

9. The edge lit display according to any one of the preceding claims wherein support means are provided adjacent the frame members on one or both sides of the
25 panel adjacent the surface of the panel, the support means being adapted to accommodate a cover sheet that covers the display panel.

10. An edge lit display according to any one of the preceding claims wherein a protective cover is releaseably
30 located within the frame to cover the panel, and releasable securing means for releaseably securing the protective cover within the frame.

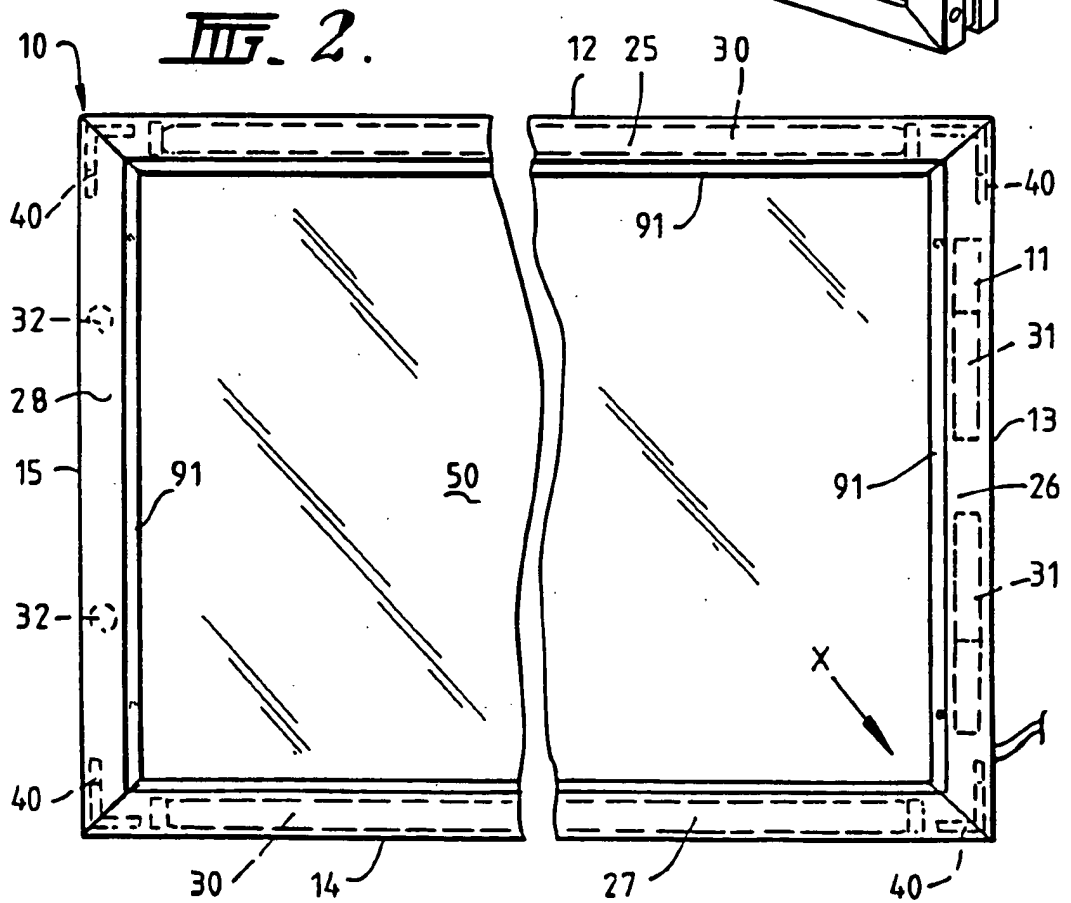
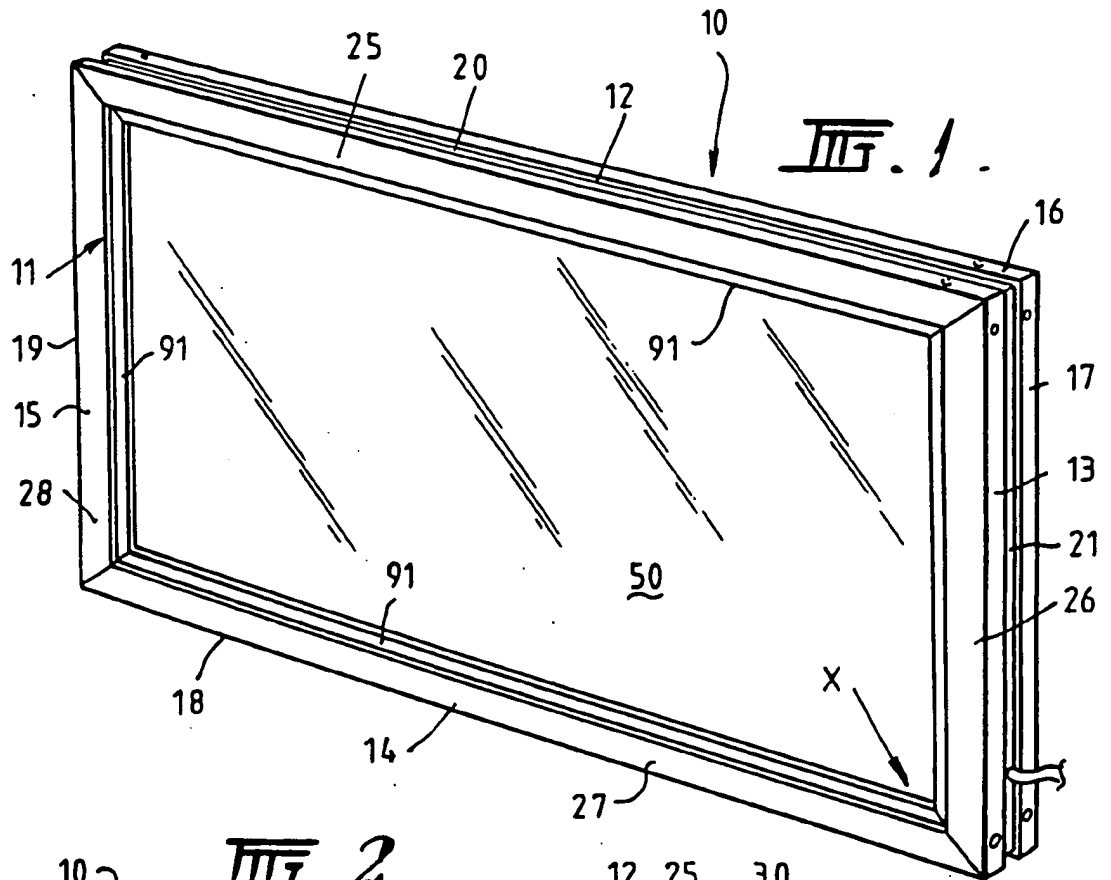
11. The edge lit display according to claim 10 wherein the securing means comprises a spring clip or a spring
35 loaded ball that acts between the frame and the protective cover.

12. The edge lit display according to any one of the

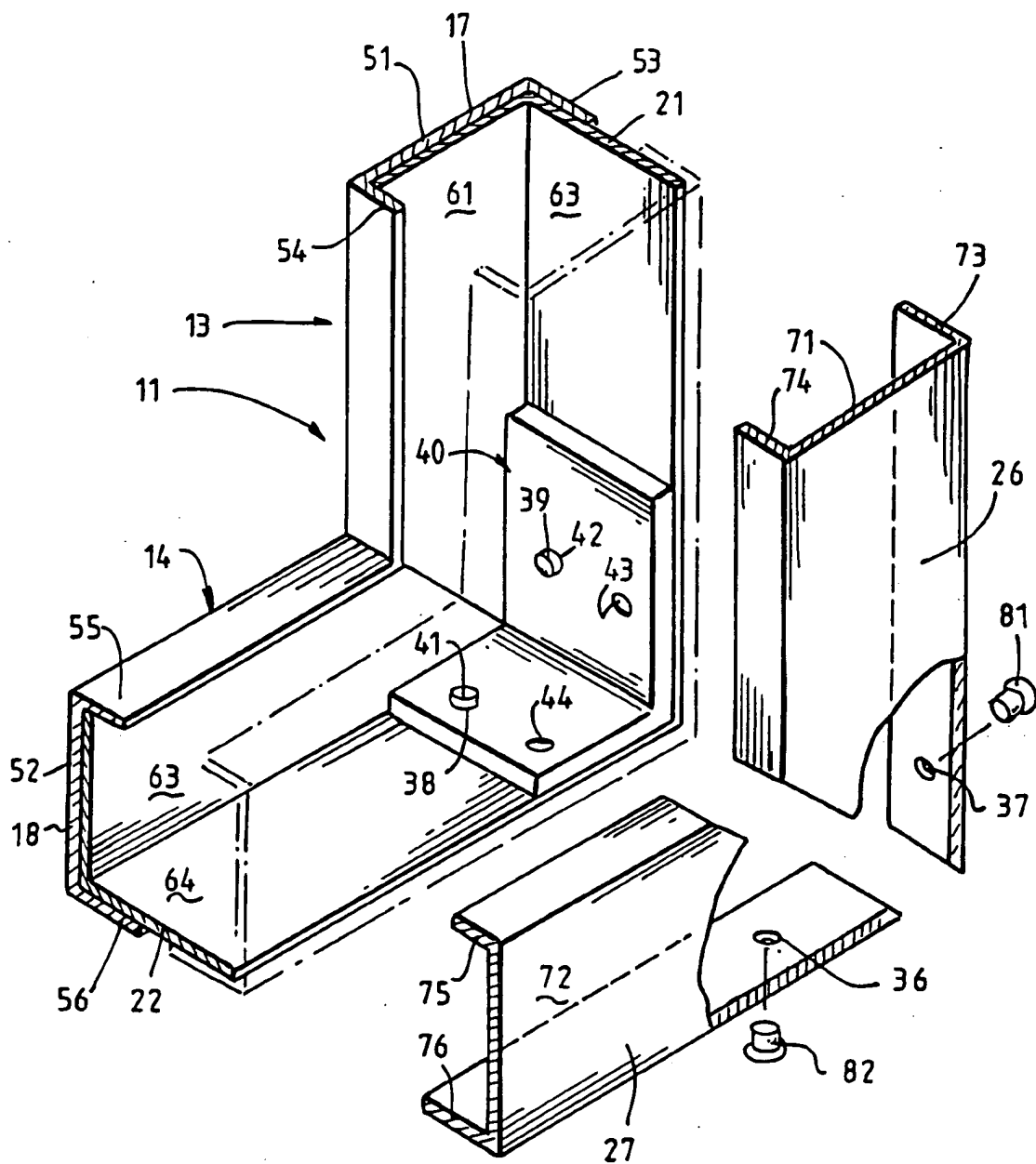
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claims 1 to 8 wherein the display panel comprises a transparent sheet having a matrix of light reflecting dots on both sides, transparent spacer sheets on each side of the matrix dot sheet, advertising transparencies on each
5 spacer sheet with a removable transparent protective cover protecting each transparency.

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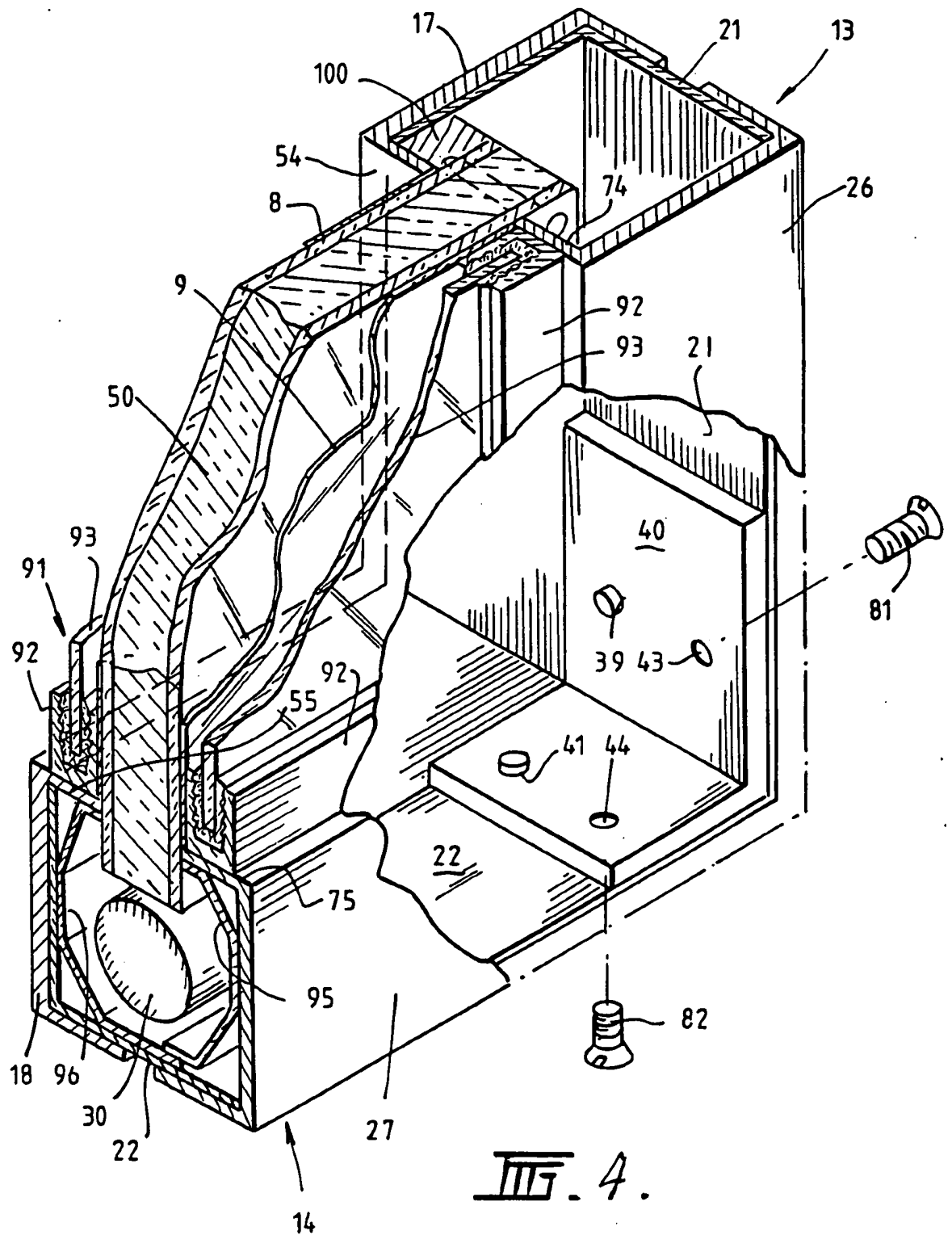


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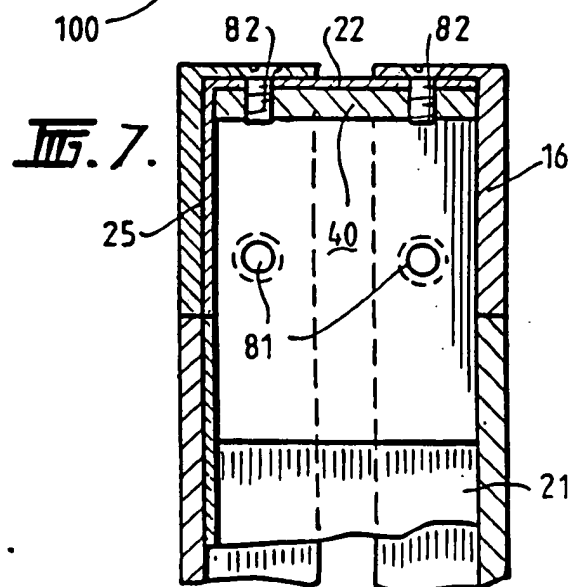
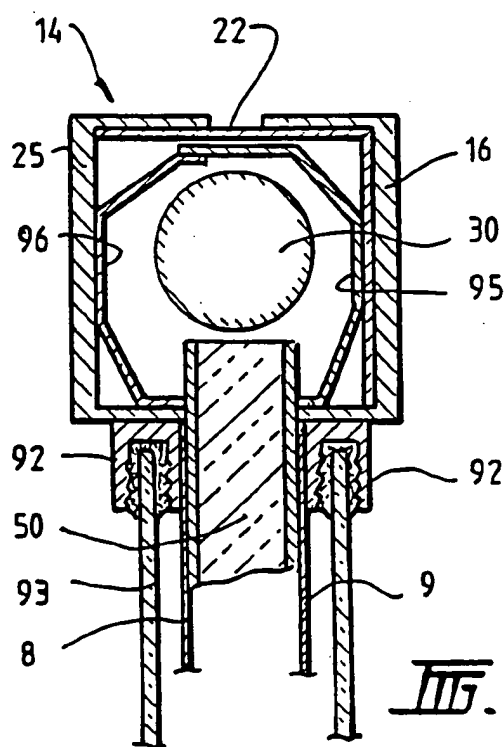
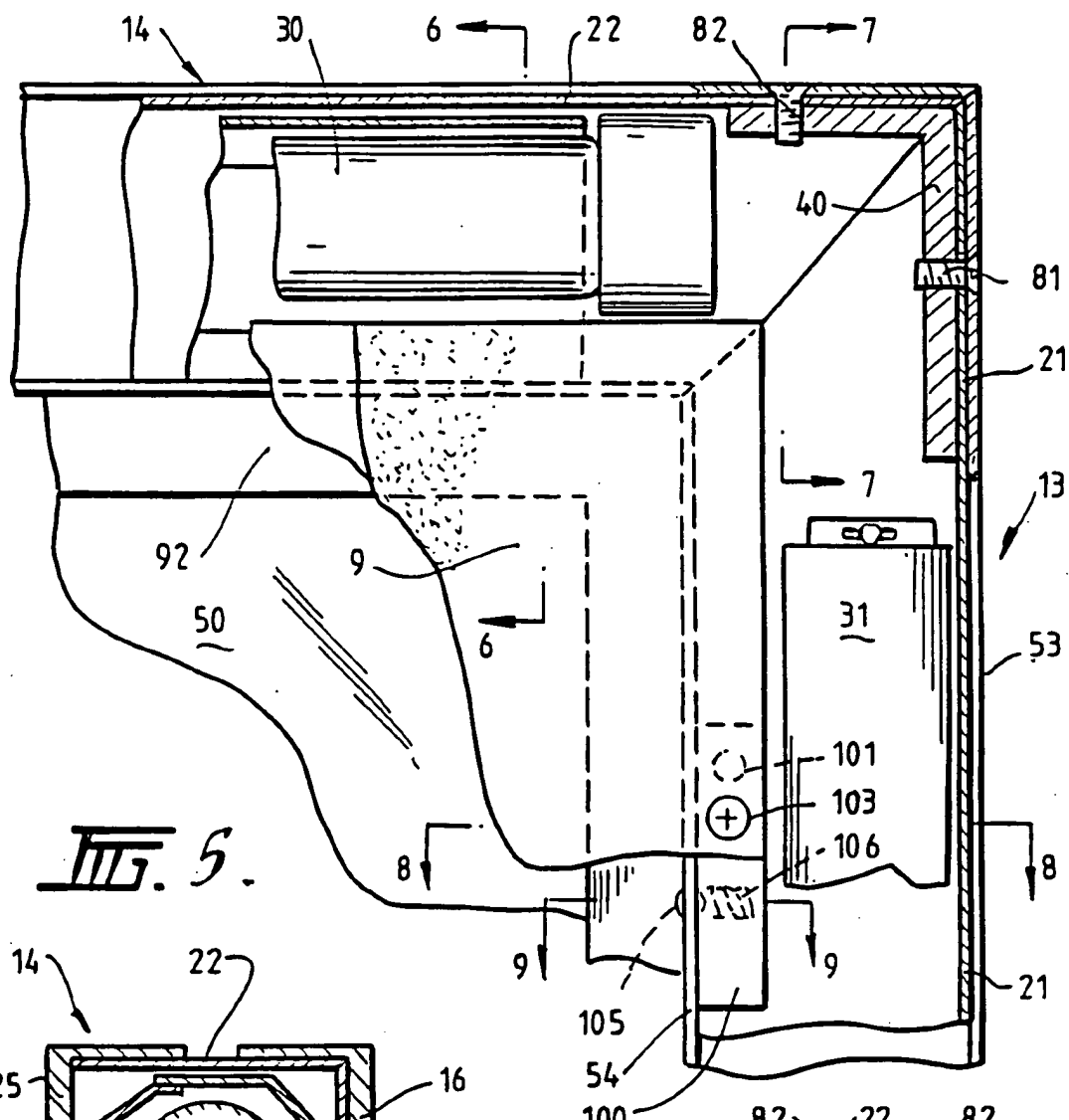


III. 3.

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FIG. 8.

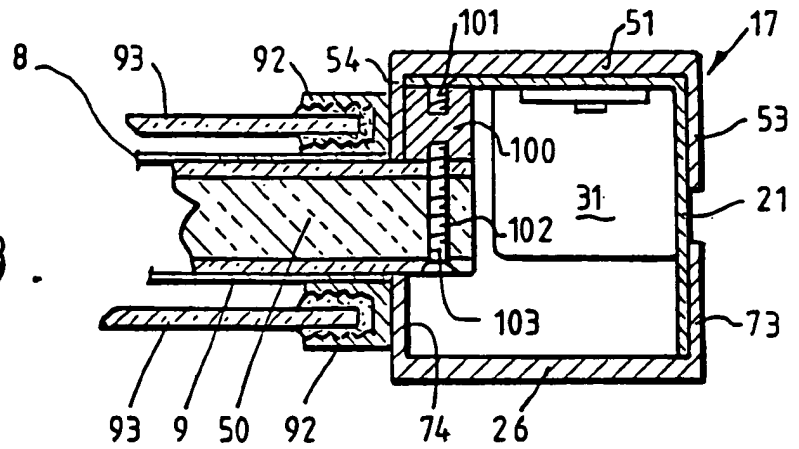


FIG. 9.

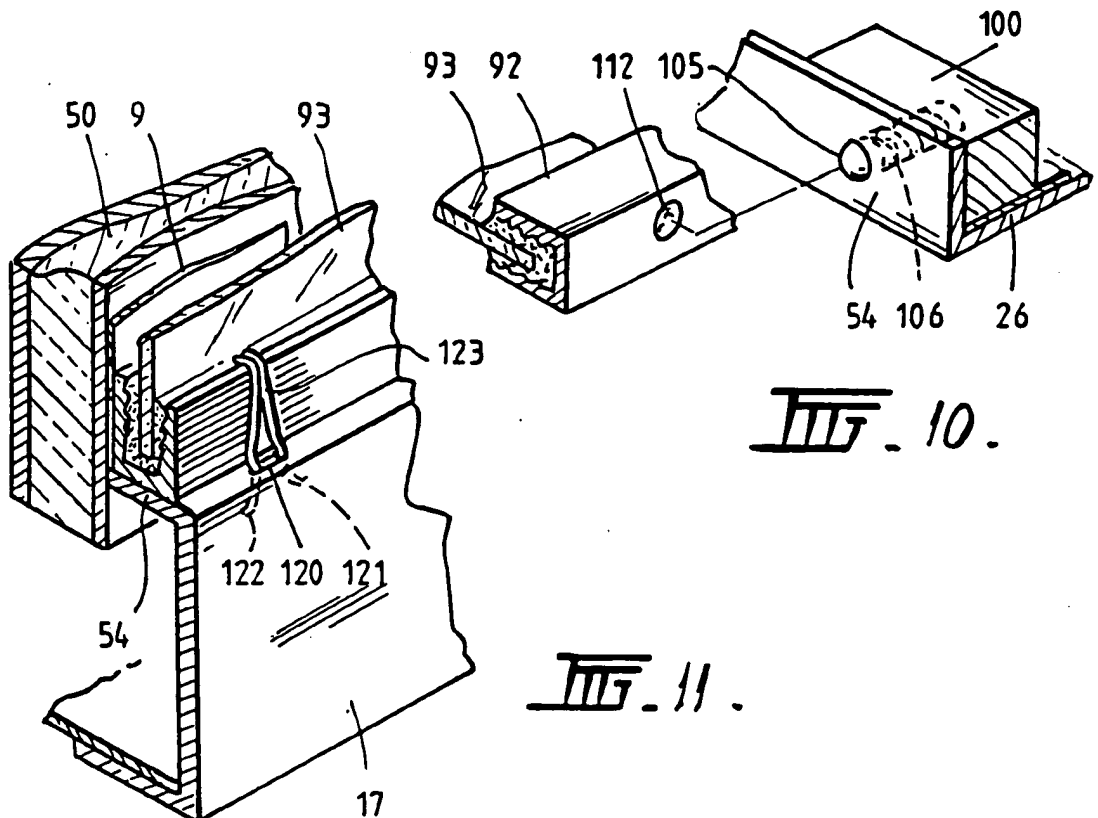
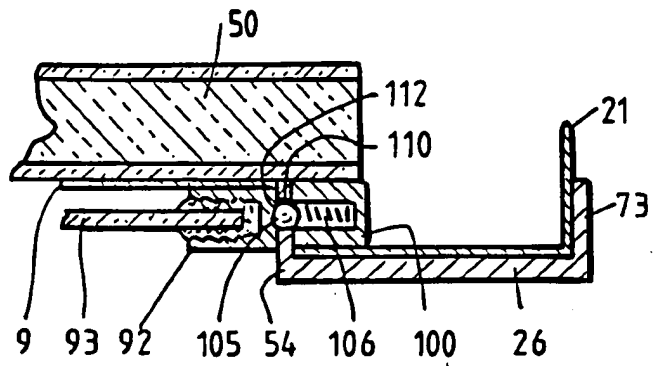


FIG. 10.

FIG. 11.

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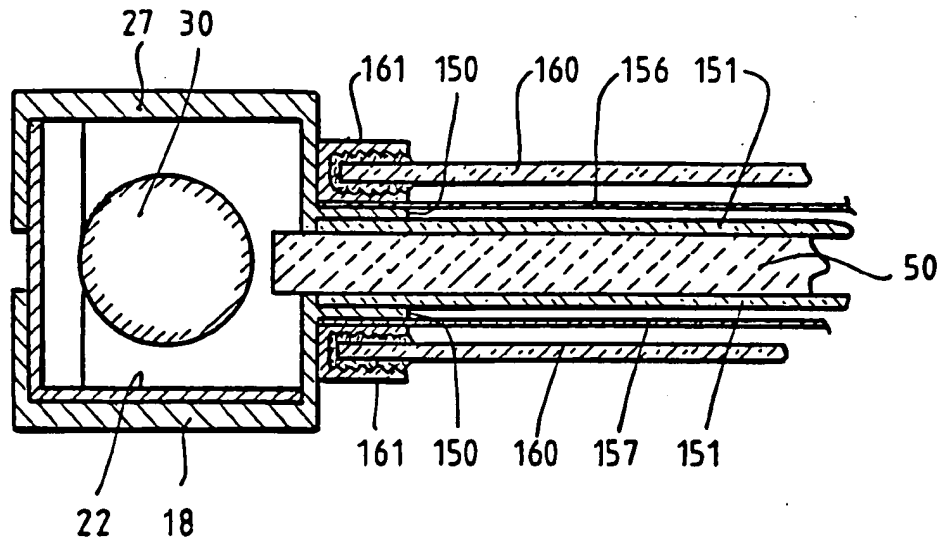


FIG. 12.

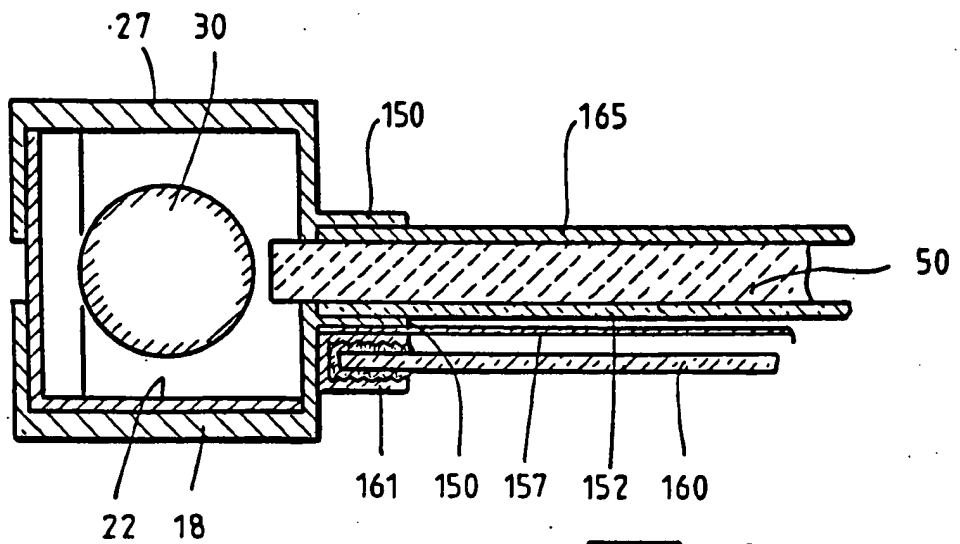


FIG. 13.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 95/00262

A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁶ G09F 13/04 According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC: G09F 13/04 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.		
X	US 4674211 A (PRATT) 23 June 1987 See whole document	1-12		
X	US 3835613 A (DAVIES, JR) 17 September 1974 See whole document	1-12		
A	US 4989122 A (ALLEKOTTE et al) 29 January 1991			
A	AU 36440/84 A (541458) B (GIDEON OBERSON PACIFIC PTY LTD) 14 March 1985			
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <input type="checkbox"/> Further documents are listed in the continuation of Box C. </div> <div style="width: 45%;"> <input checked="" type="checkbox"/> See patent family annex. </div> </div>				
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Date of the actual completion of the international search 9 August 1995		Date of mailing of the international search report 16 AUGUST 1995		
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929		Authorized officer <div style="text-align: center; font-family: cursive; font-size: 1.2em;">John Thomson</div> J W Thomson Telephone No. (06) 2832214		

INTERNATIONAL SEARCH REPORT

Information on patent family members:

International application No.

PCT/AU 95/00262

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Patent Document Cited in Search Report		Patent Family Member	
US	4989122	DE	8906016
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